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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/905,053	07/12/2001	Hung-Tien Yu	005552	3453
32588	7590	06/21/2004	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			LEE, HSIEN MING	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 06/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/905,053	<b>Applicant(s)</b> YU ET AL.	
	<b>Examiner</b> Hsien-Ming Lee	<b>Art Unit</b> 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-6 and 10-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 20-23 is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6,13,14,18,24,29 and 30 is/are rejected.
- 7) ☒ Claim(s) 5,10-12,15-17,19,25-28,31 and 32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

*Hsien Ming Lee 6/15/2004*

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## DETAILED ACTION

### Remarks

1. Claims 24-32 are newly added. Thus, claims 1-2, 4-6 and 10-32 are pending in the application.

### *Claim Objections*

2. Claim 28 is objected to because of the following informalities: an indefinite term “30 seconds or **more**” since “more” does not define an upper limit (Emphasis added) Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 4, 6, 13, 14, 18, 24, 29 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Geiger et al. (US 6,733,955)

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the

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reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

In re claims 1-2, 4, 6, 13, 14, Geiger et al., in Figs. 3-4 and related text, teach the claimed deposition method capable of filling recesses in a substrate, the method comprising:

- (a) providing a substrate 224 having recesses 228 defining side walls 232 and recess bottoms 230 (Fig.3A);
- (b) exposing the substrate to an energized deposition gas comprising a first component comprising ozone and a second component comprising TEOS (col. 8, lines 12-14), to deposit a first layer of a material in the recess 28 at different rates over the side walls 232 and recess bottoms 230; and
- (c) reducing the ratio of the first component (i.e. ozone) to the second component (i.e. TEOS), to deposit a second layer of the material over the first layer in the recess 228, i.e. adjusting the flow rate of the ozone (i.e.  $O_3$ ) and/or TEOS so that the first layer of the material (i.e.  $O_3$ /TEOS layer), which is located at the lower portion of the recess 228, is deposited at a higher deposition rate and the second layer, which is located at the upper portion of the recess 228, is deposited at a lower deposition rate (col. 8, lines 14-24).

In re claim 18, Geiger et al teach depositing the first layer to a sufficient thickness to fill the reentrance cavities 228.

In re claims 24, 29, and 30, Geiger et al also teach the claimed method of filling recesses or shallow trench 228 with a dielectric material (i.e.  $O_3$ /TEOS layer), the method disposing a substrate 224 defining a recess 228 between raised features into a processing chamber; and comprising:

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continuously introducing a deposition gas (i.e. TEOS and ozone) into a processing chamber while gradually changing a relative composition of the deposition gas (i.e. gradually changing the flow rate of ozone and/or TEOS), such that conformality of the dielectric material within the recess decreases, and deposition rate of the dielectric material within the recess increases (i.e. to maximize the O<sub>3</sub>/TEOS. Ratio to increase the deposition rate from the recess bottom to the recess top, col. 8, lines 26-28).

***Allowable Subject Matter***

5. Claims 5, 10, 11, 12, 15-17, 19, 25-28, 31-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
6. Claims 20-23 are allowed.
7. The following is a statement of reasons for the indication of allowable subject matter:

None of the prior art teach reducing the volumetric flow rate of O<sub>3</sub> to TEOS in the deposition gas to fill the recess with silicon oxide after the first layer is formed.

***Response to Arguments***

8. Applicant's arguments filed 4/8/04 have been considered but are moot in view of the new ground(s) of rejection.
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on M-F (9:00 ~ 5:00).

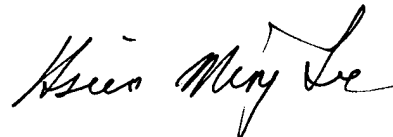
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-Ming Lee  
Primary Examiner  
Art Unit 2823

June 15, 2004

  
6/15/2004